

Through the Looking Glass: from architecture deserted to architecture revived - industrial architecture's passage across time

Ajanta Sen

(1) Introduction:

The 1964 film 'Red Desert' by the proclaimed neo-classical Italian film director Michelangelo Antonioni shows its star, the attractive Monica Vitti, standing in an image of ironical contrast in front of a derelict industrial warehouse against the setting sun.

This signature industrial landscape, at its bleakest best, became Antonioni's way of depicting "eloquently composed emptiness and a mood of sadness, too diffuse to produce the sharpness of despair, in which human contact is mostly tentative and anti-climactic."

[Hubert Meeker, Renaissance of the Film, (Julius Bellone, ed.), Collier Macmillan, London, 1970].

(2) The monumental neglect of industrial architecture as an exclusive identity:

If art as a reflection of life were to be taken seriously, this film could serve as a severe indictment, or at the very least, a critique about the form that industrial architecture may have taken on in the popular psyche by the middle of the 20th century.

Part of the reason for its unremarkable impression upon the popular psyche is the fact that industrial architecture has remained rather obscure as a stream of study. Nonetheless, it had to be factories that had led the way in innovative building design and technology during the period 1840-1940. Just as it is factories, without a doubt, that had provided "the development of Modern Architecture" with significant signposts. And incredulous as it might sound today, it is the early industrial factories of Britain, Europe and early 20th C America that contain the genus of today's contemporary 'high-tech', viz., "an architectural style subject to the purification of the machine" (*Rob MacDonald, Centre of Architecture, Liverpool John Moores University, 1999*).

Industrial architecture, as architecture applied to the construction of factory sheds and buildings and other industries-related paraphernalia such as warehouses and cooling towers, is considered to have played "a minor part" in the overall history of architecture. This is perhaps because industrial architecture demands a certain type of analysis to include both the manufacturing process as well as the building product.

This does not, however, diminish the importance or the scale at which industrial architecture has been practised. While architect Louis Sullivan's dictum "form follows function" is never more valid than when applied to industrial buildings, it is nonetheless true that industrial buildings do not necessarily lead to any sort of dull uniformity as to merit the kind of obscurity it has so far. The relative costs of labour and material as well as the effect of local traditions should go some part of the way to mitigate such homogeneity. For example, high labour costs in the USA have naturally paved the way for an overwhelming preference for steel construction since this ensures rapid assembling. Whereas in countries such as Mexico and India labour has often replaced the use of mechanized processes. As for the influence of tradition, Japanese constructions lend themselves to distinctive designs as no place else.

(3) Issues and contributions surrounding industrial architecture:

In recording industrial architecture's passage across time, two observations are in order here:

(1) The revolutionary transfer of trans-Atlantic technology and design (from Britain and the Continent to America) as a boost to American industrial architecture, at least, until the first quarter of the 20th century.

(2) The synergy that industrial architecture, in its century-old existence, has come to develop with the profession of industrial design. This is perhaps because both industrial architecture and industrial design address themselves to the basic question of productionising/assembly-lining, resulting in shared methodologies, prototyping and technology applications.

On the first issue of how industrial architecture was characterized by trans-Atlantic transfer of technology, the story begins with industrial architecture's earliest ancestry harking back to inputs received from engineers rather than from architects. This was around the last half of the 19th century, which had already heralded the arrival of Toffler's Second Wave, viz., the industrial revolution, and with it, the emergence of "bigness" in Britain and on the Continent. The transformation of civilization by the industrial revolution had already expanded the types of buildings required: factories, warehouses, railroad stations, exhibition pavilions, offices etc., not to mention the need for rail viaducts, bridges and canal systems for the movement of raw material, finished products and labour to and from factories. And yet, the actual conversion of these requirements into constructed artefacts/buildings was still being addressed as a profession by engineers alone.

Chief amongst them was British engineer, Sir William Fairbairn, whose engineering skills had made a major impact on factory and Industrial architecture across time

mill designing for British and European industrial sites as well as have American engineers visit these sites for design inspiration. Then there was the French Francois Hannebique who had patented the process of monolithic reinforced concrete in 1892 and used it to great effect at the Paris Exhibition structure in 1900. Followed by Max Toltz of Canada with his reinforced concrete silo structures. Then, in 1900, emerged USA's own Ernest Ransome, the inventor of the twisted reinforcement. Once again back to the Swiss Robert Maillart who built the first beamless floor slab in Europe in a five-storey warehouse at Altdorf in 1912. And finally, the important transition of the reinforced concrete frame from being a tool in the hands of engineers at the Fiat Works in Turin in 1915 to being "appropriated as the primary expressive element of an architectural language" by Frank Lloyd Wright. Considered "technical precociousness" for an architect to do the engineer's work, Lloyd Wright had independently designed his own re-inforced concrete structures for his E-Z Polish factory (1905) in Chicago. Followed by Le Corbusier's use of this as a medium of architectural expression for his 'Maison Dom-Ino' proposal of around 1915.

Industrial architecture also owed its birth to another major benchmark, viz., the more explicit and articulate technique of '*ciment arme*' as opposed to '*beton arme*' (reinforced concrete) considered quite monolithic in its expressive abilities. '*Ciment arme*,' which depicts the use of hybrid reinforcements, viz., brick combined with concrete and patented by engineer Cottancin in France in 1890, was to find its true appeal in rationalist architect Anatole de Baudot who demonstrated its expressive qualities, for the first time, by applying it to constructing the church of St-Jean-de-Montmartre in Paris in 1894. Baudot's turn of the century vision of "revealed structure as the only valid basis for expression in architecture" would do a great deal as an aesthetic operative for designing factories, and staged a grand comeback in the public domain through Sir Richard Rogers's Centre Pompidou (Paris, 1977). But more pertinent to our context here is later developments such as reticulated flat slabs and pre-fabricated folded shells that were based on the construct of *ciment arme*. Discovered a half century later by Italian engineer Pier Luigi Nervi, he applied it successfully to the Gatti Wool factory built outside Rome in 1953. (Kenneth Frampton, *Modern Architecture: critical history*, Oxford University Press, New York, 1980).

On the second important issue regarding the synergies between industrial architecture and industrial design, it has to be said that, to a very large extent, it was industrial designers such as Walter Gropius and Peter Behrens (also architects in their basic vocation),

who had pulled industrial architecture out of its obscurity by building icons of industrial architecture.

And then, moving on into the sixties, it was once again industrial designers and their patron industries such as Braun and Olivetti who heralded reformism in industrial architecture by commissioning architects. Who, rather than fragment the functioning of industrial spaces from other spheres of activity such as office, recreation, and housing, actually attempted to integrate these functional spaces into one coherent and aesthetic whole. Olivetti, in particular, is known to have changed the entire concept of what a factory ought to be - technically competent and yet humanized in its workplace.

With few exceptions, industrial architecture truly blossomed only during the early decade of the 20th century. Fascinated with the advent of glass and steel as new industrial tools of construction, Frank Lloyd Wright, Peter Behrens and Walter Gropius took to industrial architecture, as fish to water, through buildings such as the following. Lloyd Wright's Larkin Building (Buffalo, 1904), Behrens' Turbine Factory (Berlin, 1909), Gropius and partner Adolph Meyer's Faguswerk Shoe Factory (Alfeld/Leine in Germany, 1911), closely followed by Gropius' model for machinery display pavilion and workshops in addition to other functional structures for the Werkbund Exhibition, Cologne, in 1914. And epitomised by Le Corbusier's Pavilion de L'Esprit Nouveau in 1925.

(4) Industrial architecture and its contribution towards use of materials and processes:

Considering that industrial architecture was to take on a "minor role" in the overall scheme of architectural idioms, it is ironical that Behren's monumental manner of articulating steel and glass and Gropius and Meyer's placement of three storeys of re-worked office space behind an entire façade of glass, with its staircase seemingly floating free, invited the following observation from Reyner Banham in 1986. He said in his 'A Concrete Atlantis: U.S. Industrial Building and European Modern Architecture 1900-1925 (MIT Press, Cambridge, 1986) that Gropius and Meyer's treatment of space "must be one of the classic locations of the modern sensibility in architecture" for "it has the kind of open, limpid, *unbegrenzt* (unenclosed) space that, in due course, would become the International Style's most beguiling contribution to the vocabulary of architecture."

In Gropius' own opinion, expressed many years later (1961), this process of the blossoming of industrial architecture had actually begun with the discovery of Bessemer steel and of Monier's reinforced concrete which would "free architecture of the

supporting, solid wall and presented it with virtually limitless possibilities for flexible planning."

Gropius continues: "the skeleton structures enabled us to introduce large window opening and the marvel of the glass curtain wall - today misused and therefore discredited - which transformed the rigid, compartmental character of buildings into a transparent "fluid" one. This in, turn, gave birth to a totally new dynamic indoor-outdoor relationship, which has encouraged the evolution of industrial pre-fabrication methods, which have by now, taken over a large part of our building process for the future." (*Gropius' 1961 acceptance speech upon being conferred the Doctor of Humane Letters degree at Columbia University*),

Across time, this trend towards glass and steel and the new found fluid relationship between the inside and outside environment, gave way to industrial innovations and modernist precedents e.g., in the first windowless or controlled conditions plant in the USA, at Simonds Saw and Co. Then there came the use of the modernist trademark glassblocks in the high-low bay roof of the Rayon Corporation. As also in the Ballinger and Co Yarn Mill of 1922 - an all windowless daylight building considered a major innovation along with The Buffalo Foundry & Plant which was made largely of glass - all of these spectacular when viewed from the outside by night.

In her path breaking book on industrial architecture 'The Works' (Oxford University Press, 1999), Betsy Hunter Bradley outlines the technological watersheds that helped industrial architecture evolve its own idiom of construction. (i) The development of the windowless wall, a radical idea, that was based on importing British Steel sash windows, available in Britain long before the USA. (ii) The use of iron components in European industrial buildings, which began in the 18th century, and included some notable examples which may have influenced construction in America. (iii) Electric power that enabled vertical craneways to be incorporated into factories such as the Studebaker Plant, Indiana. And finally, (iv) the need for fire-resistant materials resulting in the introduction of hollow terra-cotta whose pioneering use may be found in the enclosing walls of a steel-framed foundry building of the Westinghouse Corporation.

(5) Beyond materials and processes - industrial architecture and the humanizing of work environment:

Of abiding interest to any client or student of industrial architecture ought to be the fact that Walter Gropius' contribution was not just about his pioneering interest in innovative materials and processes. Industrial architecture's most remarkable contribution to the profession of architecture stems from Gropius'

personal desire "to design for the most advanced means of production and to contribute towards the humanizing of working conditions by taking account of the findings of psychologists and sociologists." In the process, "to be able to free the workers from the monotony of the manufacturing process." (*Reginald Isaacs, Gropius' biographer and among Gropius' first batch of students at Harvard University, 1983*).

This concern for the humane, expressed in November 1963, had arrived way ahead of its times when architecture was steeped in a 'New Brutalism' known to be characterized by rationalism and by the least concern for human emotions. Gropius' humane found articulation through a joint commissioning with architect Alex Cvijanovic. This was for designing a china factory in Selb and upon successful completion of this project, the further commissioning to design the Thomas Glass Factory in Amberg (1967-69), now considered as Gropius' finest factory design since Faguswerk fifty years ago. Gropius' attempt to humanize the worker's environment is reflected in his attempt to include, as part of the glass factory, the following features: a conservatory, an aviary, an information center and leisure-time facility. He also imparted to the central glass-blowing hall great scale and a high, steeply pitched roof to alleviate the perils of the glassblower taking in too much smoke, and altogether giving it the moniker of the "Glass Cathedral."

Carrying this ideology forward, exactly from where Gropius left it off with his death in 1969, were Germany's Braun and Italy's Olivetti. These were the sixties' flagship setups for reforming the domain of industrial architecture. While recognizing the *raison d'être* of industrial architecture as being operational efficiency (economically built and optimally maintained constructions), companies such as these were beginning to see natural affinities between efficiency-factors, the humanization of work sphere and aesthetics.

The root of this recognition lay in

- (i) worker strife and discontent, the rise of organized labour and the severity of employee compensation laws, all this partly arising from an internal environment of health and safety hazards; and
- (ii) a heightened perception about productivity and public image from an increasingly more sophisticated clientele.

It is perhaps serendipity that both Olivetti (in 1971) and Braun Pharmaceutical (in the '80's) as also British telecom (1983) happened to commission the luminous James Stirling to build their headquarters for locating both factory and office.

Stirling, who had already received another industrial commissioning in 1965 from Dorman Long, England's largest producer of rolled steel, had emphatically maintained while designing for Dorman Long that "humanistic considerations must remain the primary logic from which a design evolves." And

assiduously strove, until his untimely death in 1992, to underwrite all his work with this as a constant. (James Stirling in Memorium, *Architectural Review*, Vol CXCI, Dec 1992).

(6) Industrial architecture and post-industrialization - in conclusion:

From the 18th C birth of industrial architecture with Toffler's Second Wave to the millennium ushering in of the "extraordinary growth of the economies of information, telematics, media and virtuality" (Mark Taylor, *The Moment of Complexity: Architecture and the Emerging Network Culture*, Univ of Chicago press, 2001) as part of Toffler's Third Wave and beyond, the time had come to understand what became of industrial architecture. Namely, from its passage across the momentous early 20th Century years into its trans-Atlantic flowering in America in the thirties, onwards into the reformist sixties, into the economic boom of the eighties and the recession of the nineties, into the present.

The two most abiding set of external factors conditioning industrial architecture in the nineties have been (i) the recession-driven resource crunch and a concomitant emphasis on conservative architectural practices; (ii) expanding population and limited resources leading to the search for more environmentally responsive and sustainable industrial and architectural practices; (iii) within these constraints, the search for solutions designed to be aesthetic; and finally, (iii) the surge of technologies pushing the envelope of innovation to its brim.

The optimist will recall with fondness that industrial architecture has often attempted to bridge the two central agendas of building-design, viz., those of technology and social purpose. And additionally cite the happy cases of conversion of industrial buildings that had outlived their use and now metamorphosed, through imaginative regeneration, into sites of public domain interests.

Prime examples of these being the Tate Modern emerging from the abandoned Bankside Power Station on the south side of Thames. Or the Cromford Mill, Manchester, now preserved as an industrial heritage site. Or, in far away Launceston, Tasmania, the conversion of an abandoned railway yard into a national museum and art gallery. Or, in Montreal, Canada, in the location of the historic Lachine Canal that had once ushered in Canada's industrial prosperity by connecting the St. Lawrence River to the Atlantic Ocean. And where, there is a project presently under way, to remodel and transform entire factories, warehouses, mills and refineries into buildings with more contemporary functions. And closer home, the conversion of the depressed and historic textiles mill district of Parel in central Mumbai into a high speculation zone where expensive real-estate today fights space for investment

banking, high-end housing, retail shopping and recreation after obliterating the original mill-workerscape.

But for the less hopeful, it may not be entirely too inappropriate to cite the example of the decommissioning of Britain's first nuclear power station, the British Nuclear Electric at Trawsfynydd (pron. Traus-Ven-ith) in North Wales in 1994. Of the several proposals developed for the decommissioning, with three of them by architects, there was one that included "a massive greening of the entire area, lake shore, and nuclear electric buildings using moss, ragweed and ivy as a means of removing toxins from soil and water through the bio-chemical reaction of certain natural vegetation to radio-active materials." (*Philip Jodidio, Contemporary American Architects, Vol II, New York, 1991-92*).

While the "fundamentally apocalyptic nature" of the problem required for one to call on the very distant past - the neolithic past - for solutions since the present seemed bereft of any light at the end of the tunnel, it is impossible to escape the essential irony. To be standing at the threshold of cutting edge technologies and having to look way past into the primitive and the primordial for regeneration!

At the end, Trawsfynydd happens to be a splendid example of an industrial architecture with its origins in the smart era of the Brave New World. But, somewhere along the way, as a dream gone bust it seems to have come full circle, yet again crying to crawl back into the security of its obscurity, from where it had once emerged a hundred years ago. In other words, perhaps it is its fate that to stay alive, industrial architecture must metamorphose or recede every once in a while to make space for the new.